Approaches to Aquatic Invasive Species Integrated Pest Management Control and Common ID

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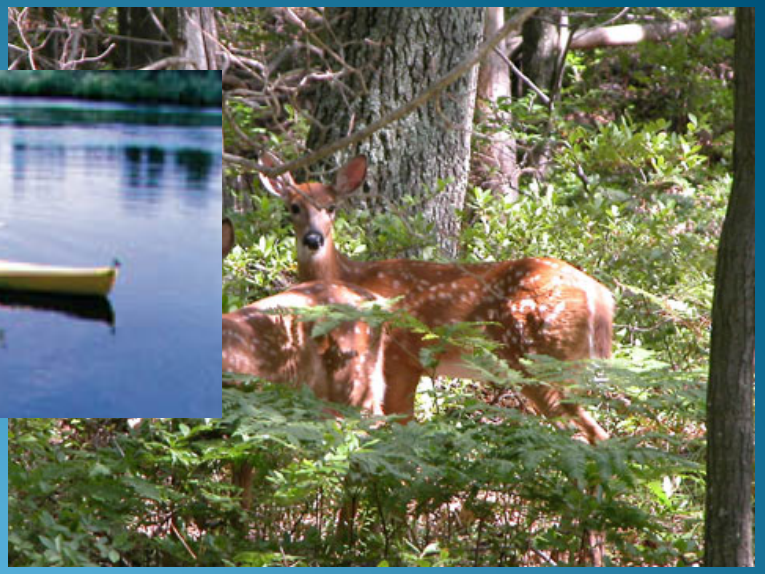
Aquatic Nuisance Species Program

Important First Step:

- Identify your problem plant
- Know your Goals for the Pond
- Know about your downstream use



Know the Law:

- Know which options may be viable and cost efficent
- Use only herbicides approved by the U.S. EPA
- Apply at the proper, legal, rates and selectively to the target plant(s)
- Apply as carefully as possible.
- You may only treat your private pond
- To treat someone else's pond you must be a licensed Category 5 applicator

Pond Management– What's your goal?

- Recreational fishing
- Swimming & boating
- Wildlife habitat / aesthetics
- Livestock water supply
- Aquaculture
- Storm water management

Basic Types of Control

- Physical – mechanical devices; cookie cutters, harvesters, rakes, etc; lake level manipulation; drawdowns.
- Biological – living organisms; pathogens, insects, fish.
- Chemical – specially designed and approved herbicide products.
- Integrated – one or more of the above

Integrated Control

Aquatic Plant Control – Physical

- Benthic barriers
- Drawdown
- Mechanical removal
- Dredging
- Dyes

Mechanical Harvesters

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Mechanical Harvesters

- Advantages
  - Site selective control
  - Removes plants from water
  - Immediate relief of problem plants
  - Perceived as environmentally safe
- Disadvantages
  - Very expensive ($600-1,000/ac)
  - Provides only short-term control
  - Spreads plant fragments
  - Captures fish and other aquatic organisms
  - Extremely slow (1-2 ac./ day), so limited control
  - Requires disposal sites

Lake Level Drawdowns

Drawdowns

- Advantage
  - Proven effective on some submersed vegetation
  - Provides moderate to long-term control
  - Controls plant growth over a large area
  - Very inexpensive (little or no cost)
- Disadvantages
  - Limits recreational uses (boating and swimming)
  - Impairs homeowner access to lake or pond
  - May require removal of larger boats from pond
  - Requires advanced planning

Sterile Grass Carp - *Ctenopharyngodon idella*

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Sterile Grass Carp

- Advantages
  - Long-term control
  - Relatively inexpensive ($60-90/ac initial; $12-16/ac after 5 years)
  - No water use restrictions
  - Can control plant growth over large areas
  - Do not reproduce
- Disadvantages
  - Slow control response
  - Impact non-target plant species
  - Difficult to regulate amount of control
  - Cannot control feeding location
  - Difficult to contain in water body

Alligatorweed Flea Beetle - *Agasicles hygrophila*

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Alligatorweed Flea Beetle

- Advantages
  - Long-term control
  - Relatively inexpensive
  - No Impact to non-target plant species
  - No water use restrictions
  - Can control plant growth over large areas
- Disadvantages
  - Slow control response
  - Difficult to regulate amount of control
  - Cannot control feeding location
  - Can be killed off by colder temperatures

Aquatic Plant Control – Chemical

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Aquatic Plant Control – Chemical

- Identify the problem plant
- Use only EPA registered and approved products
- Read and follow all label directions
- Timing
  - late spring, early summer
- Temperature
  - Over 65°
- Retreat?

Aquatic Herbicides

- Advantages
  - Effective on a range of plants
  - Provides site selective control
  - Limited water use restrictions
  - Most are approved for drinking water supplies
  - Can control relatively large areas (~80 ac/day)
- Disadvantages
  - Controls some non-target species
  - May be toxic to fish
  - Some are slow acting
  - Control level variable
  - Limited effectiveness in deep water (>6 ft)

Recent Advancements in Herbicides

HardBall®

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Recent Advancements in Herbicides

- **Hardball, Sinkerball** - Liquid 2, 4-d
  - $30-40 per gallon - Up to 5 gallons per application ($200)
- Vs granular 2, 4-d
  - $2.50-3.50 per pound - 150-250 lbs per acre per application($875)
- Renovate Max-G - Mix of Renovate 3 and 2, 4-d
  - $2.80-3.50 per pound - 150-200 lbs per acre per application($700)
  - Gives longer lasting control

- **Renovate 3** - triclopyr
- Triclopyr, rapidly enters through the target plant's leaves and stems, interfering with plant metabolism, and providing systemic control of susceptible plant species. The herbicidal power of Renovate impacts most dicot (broadleaf) plants, while having little to no impact on most monocots (grassy type species), providing an excellent tool for aquatic ecosystem restoration programs.
- Renovate carries no restrictions on recreational use such as swimming and fishing, or on livestock consumption of water from the treatment area. Renovate can be used near active potable water intakes.

- **Galleon SC** - Penoxsulum
- Key target aquatic weed species: hydrilla, water hyacinth, water lettuce, salvinia species, frog's bit and duckweed.
- Multiple forms of application give flexibility to choose best management option:
- Injection for large-scale, in-water treatment of submersed and floating species
- Foliar sprays via ground, boat, or aerial application for targeted treatments of floating and emergent species
- Direct application to exposed littoral sediment for pre-emergence control following drawdown or other low-water events.
-

- **<u>Clearcast</u> - Imazamox**
- Cost - $175 per gallon
- **Recommended Rates – Cattails**
- 64 ounces/acre broadcast
- Use rates 32-64 ounces/acre broadcast
- 1% solution spot spray
- **Recommended Rates – Chinese tallow**
- 64 ounces/acre broadcast
- 2% v/v solution spot spray
- 50% v/v solution hack & squirt
- 50% v/v solution cut stump

- **Clearcast Benefits**
- Applications can be made near desirable hardwood vegetation
- Controls the entire plant, including root system
- Minimal soil residual allows for re-colonization of desirable species
- Minimal irrigation restrictions
- Labeled for golf course waters used for irrigation

Common Problems

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Water hyacinth - *Eichhornia crassipes*

- Thick, waxy, glossy leaves
- Stalks are bulbous and spongy
- Distinctive White and Bluish "orchid like" flower with 6 petals

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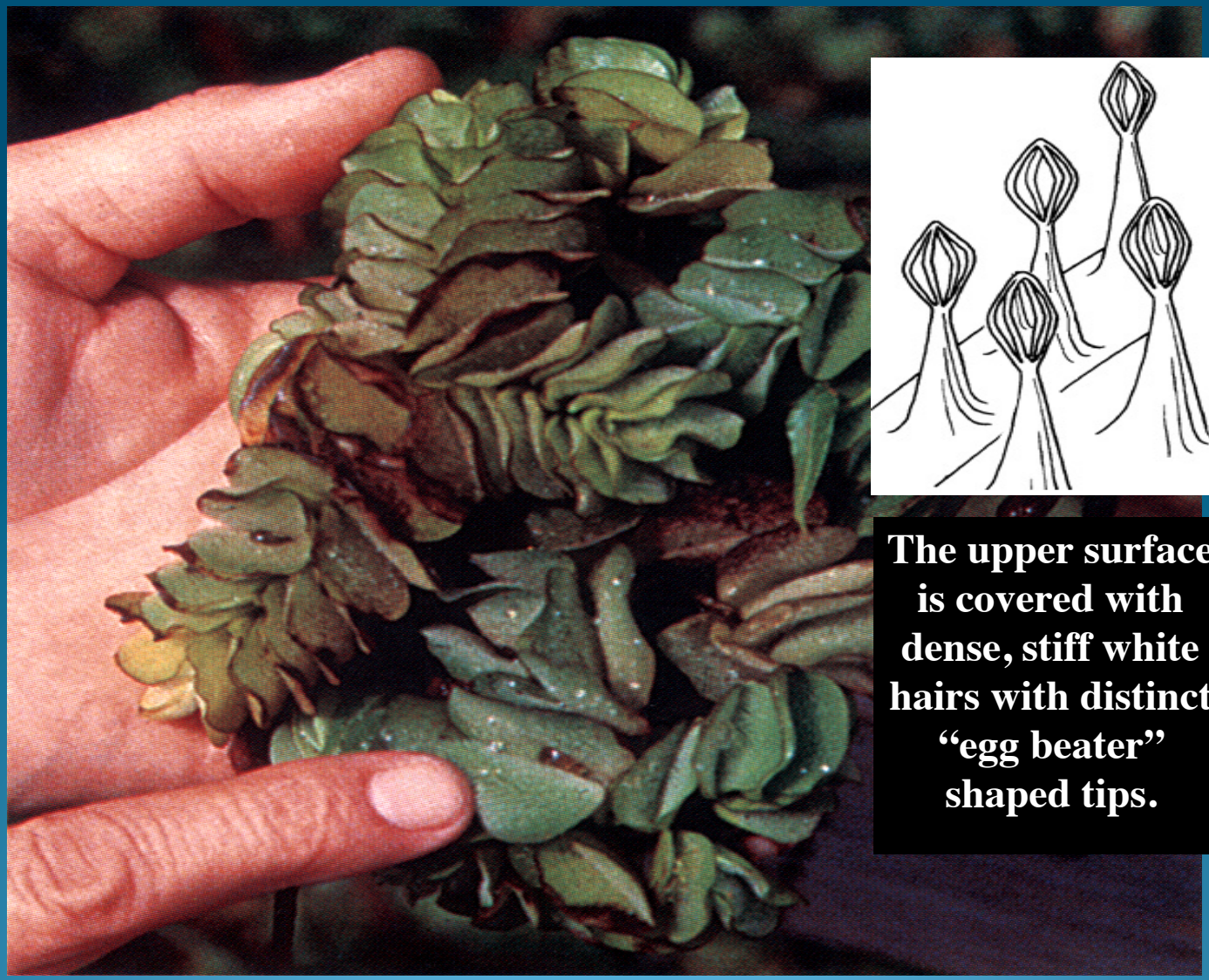
Giant salvinia - *Salvinia molesta*



The upper surface is covered with dense, stiff white hairs with distinct "egg beater" shaped tips.

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Water lettuce - *Pistia statiotes*

- Thick, soft light green leaves; usually with small soft hairs covering the plant
- "Velvety" to the touch
- Resembles a small head of lettuce

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Water chestnut - *Trapa natans*

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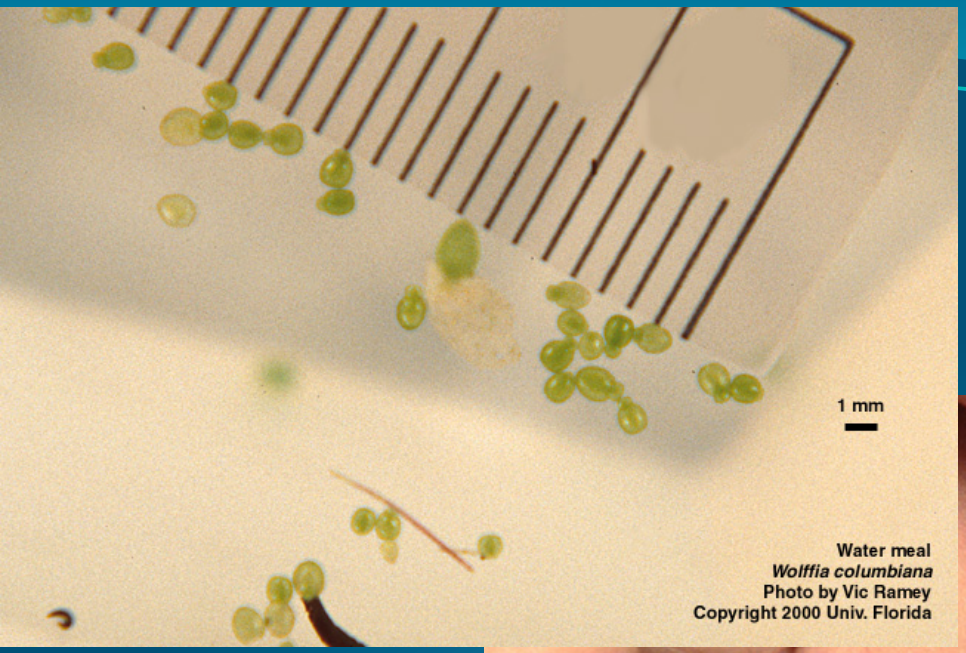
Watermeal
Wolffia columbiana



Water meal
Wolffia columbiana
Photo by Vic Ramey
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Water meal
Wolffia columbiana
Photo by A. Murray
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Duckweed
Lemna minor

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Common reed - *Phragmites australis*

- Alternate leaves
- Grows in clumps
- Bluish-green color
- Very dense growth habit
- 10-12 feet tall

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Water primrose - *Ludwigia hexapetala*

- Alternate willow-like leaves
- Bright yellow flower normally with 5 petals
- Can have different characteristics in rosette stage

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•Opposite willow-like leaves
•White “sno-cone” flower
•Branched, hollow stems

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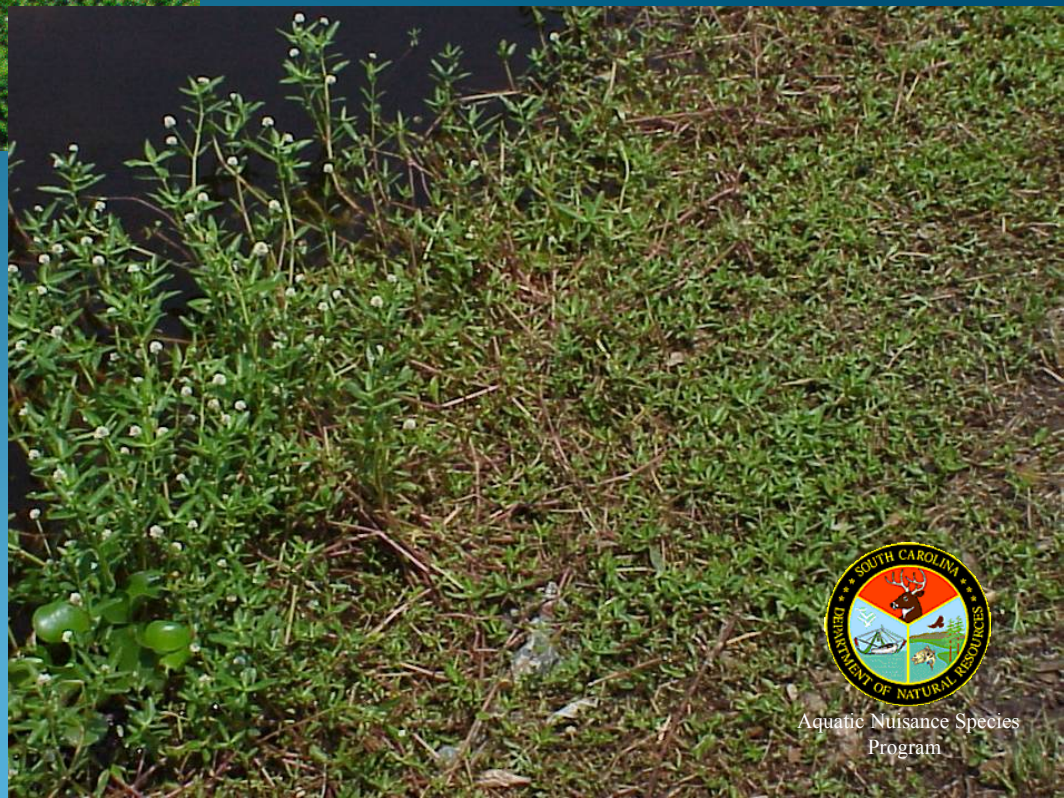
Alligatorweed

- Emergent, marginal plant
- Opposite entire leaves and hollow stems
- White, clover-like flower
- Spread by seed and fragmentation

Alligatorweed

Alternanthera philoxeroides



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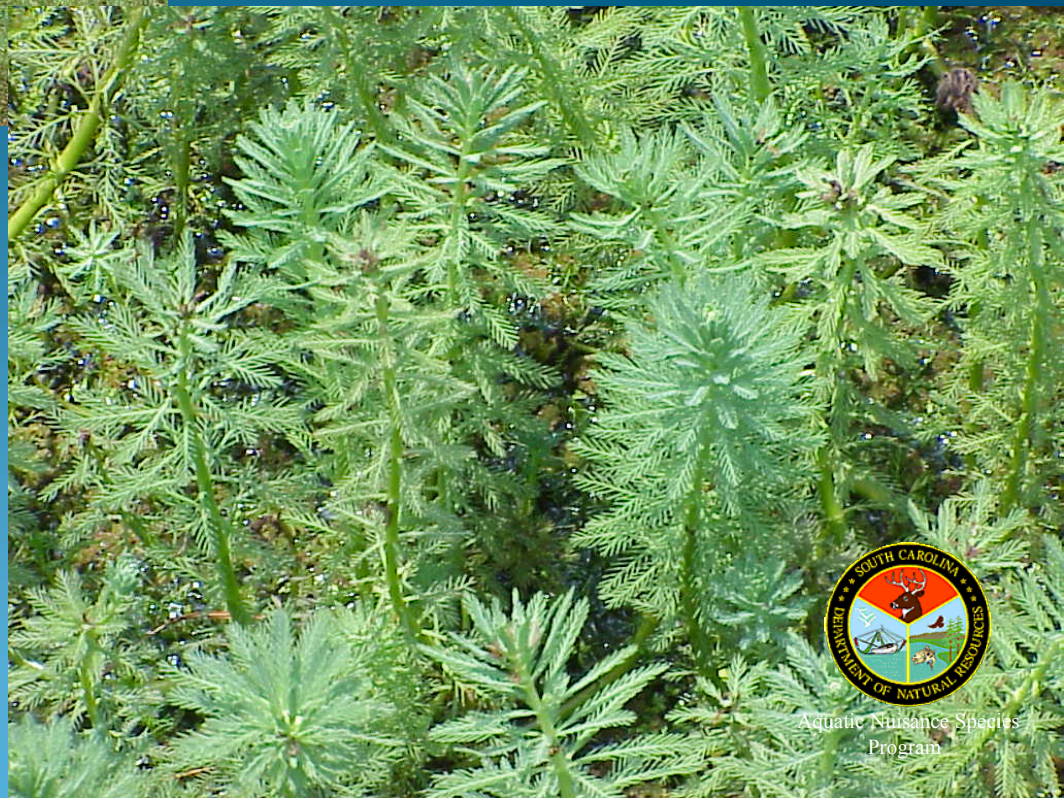
Parrot feather

Myriophyllum aquaticum



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Parrotfeather

- Submersed or emergent
- Feather-like leaves in whorls
- Grayish appearance to emergent foliage
- Stems may have reddish appearance
- Common throughout SC

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Submersed

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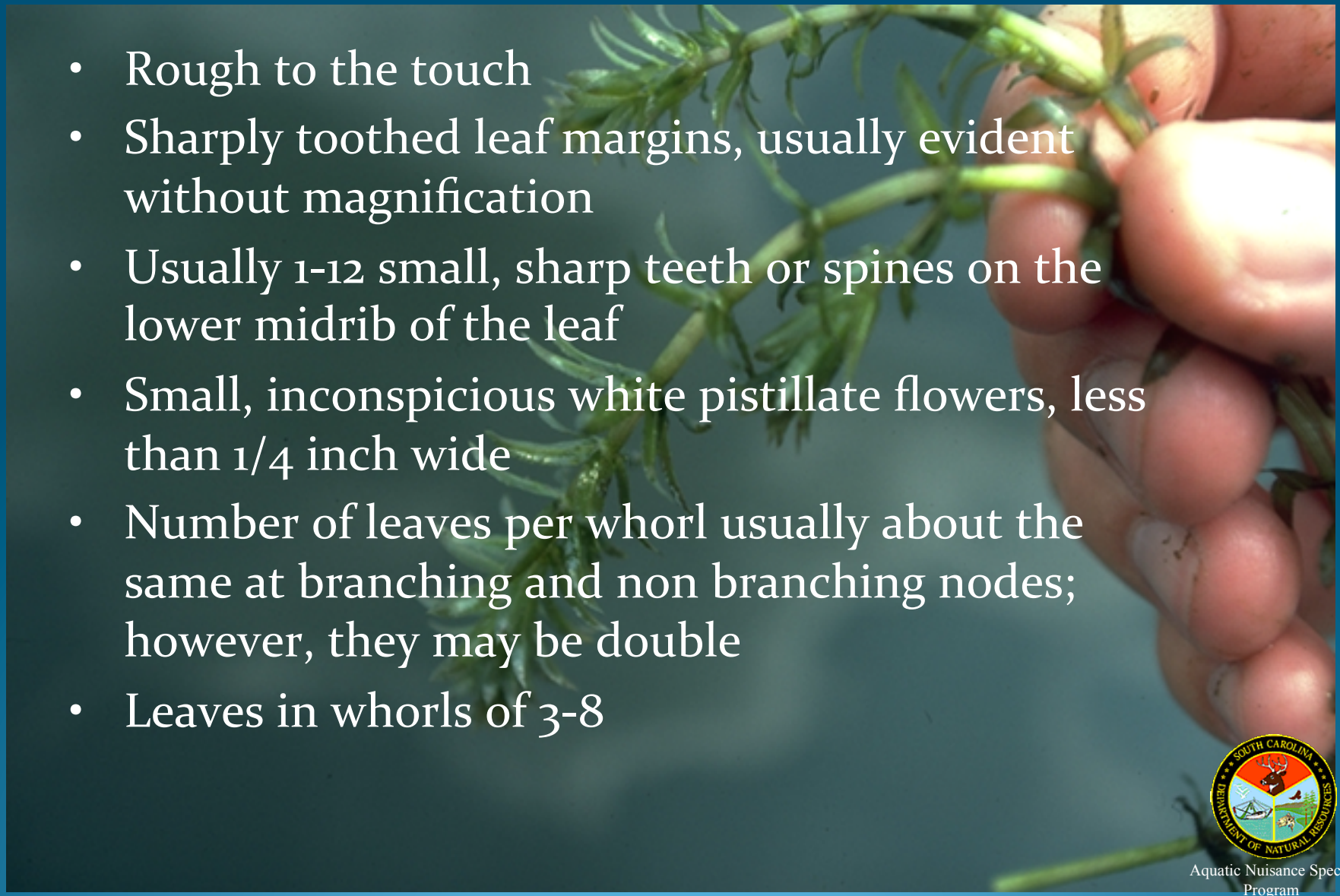
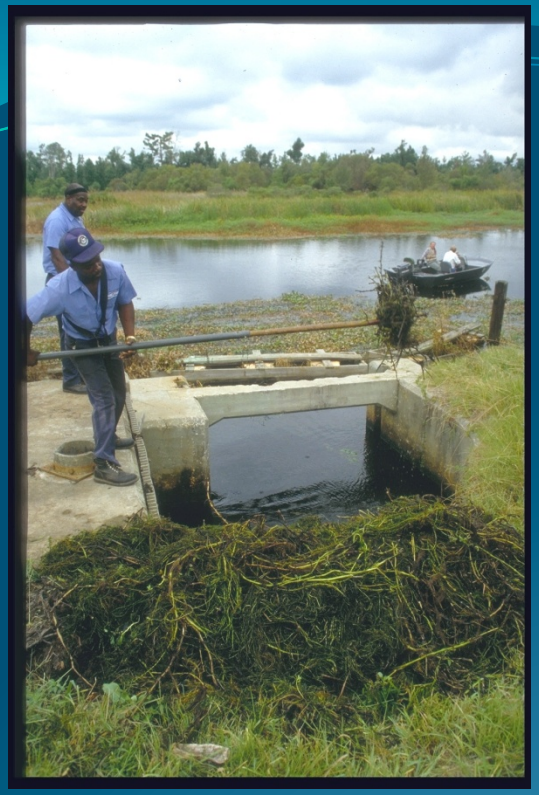
Hydrilla - *Hydrilla verticallata*



- Rough to the touch
- Sharply toothed leaf margins, usually evident without magnification
- Usually 1-12 small, sharp teeth or spines on the lower midrib of the leaf
- Small, inconspicious white pistillate flowers, less than 1/4 inch wide
- Number of leaves per whorl usually about the same at branching and non branching nodes; however, they may be double
- Leaves in whorls of 3-8



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Brazilian elodea - *Egeria densa*

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Slender naiad - *Najas minor*

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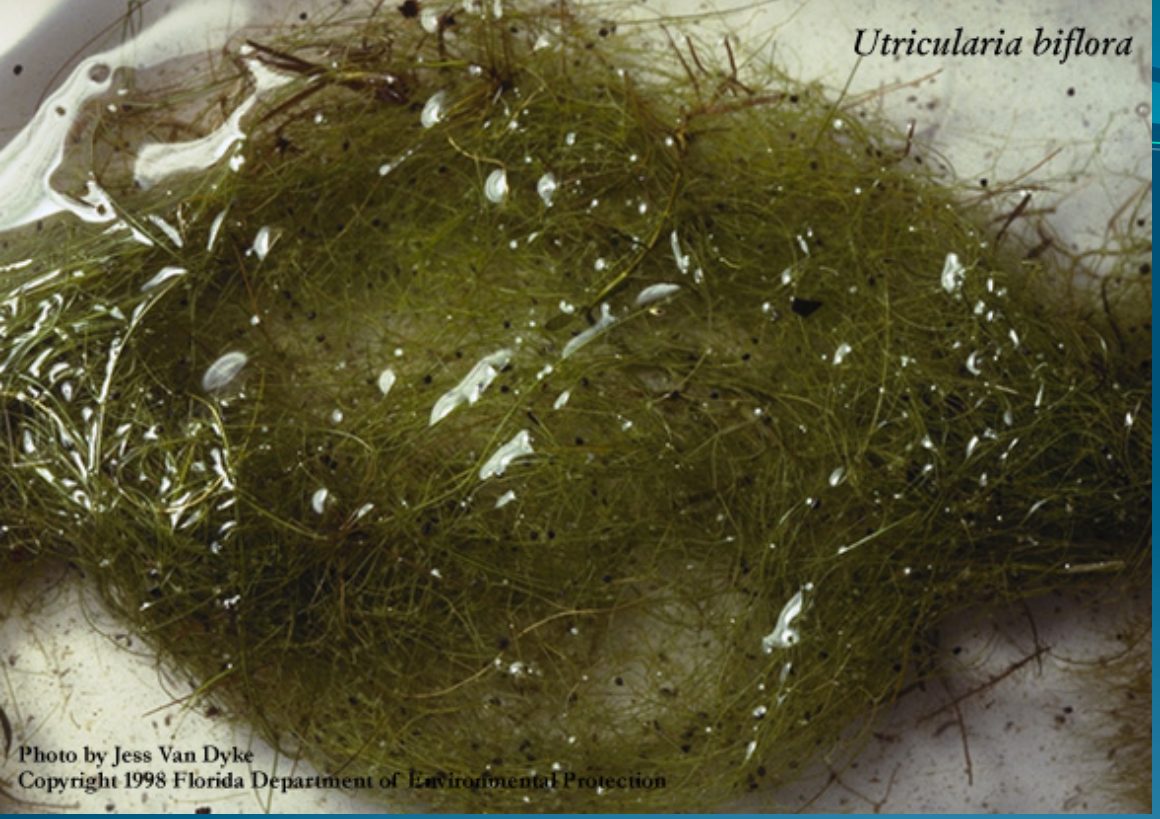
Submersed Bladderwort *Utricularia spp.*



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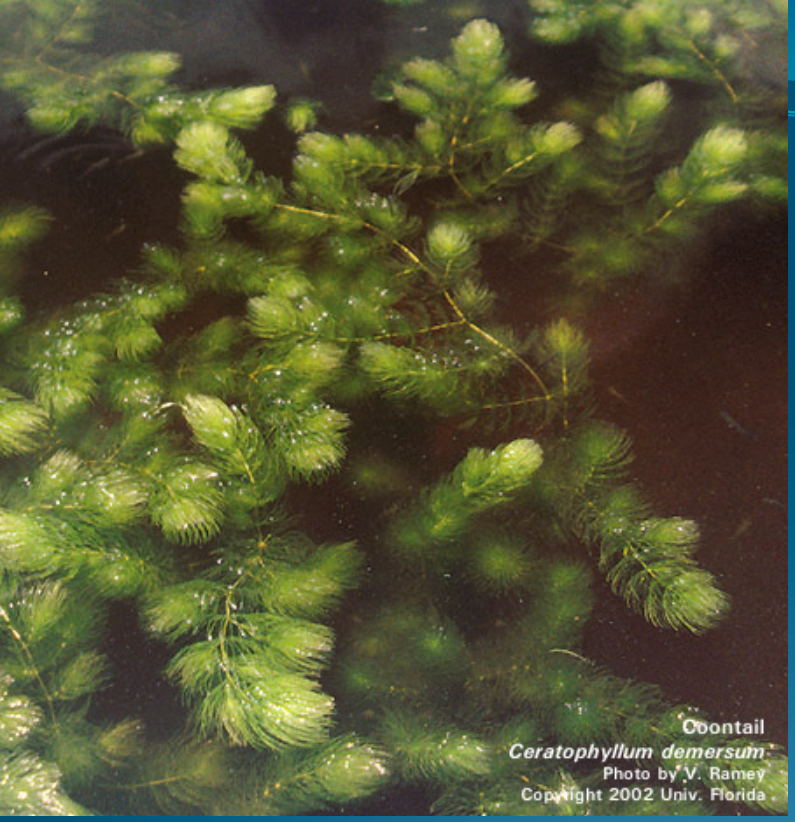
Submersed Coontail *Cerataphyllum demersum*



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Submersed Variable-leaf milfoil *Myriophyllum heterophyllum*

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Submersed

Bog moss

Mayaca fluviatilis

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Pondweeds

Potamogeton species

There are about 80 species of pondweeds in the world.
Pondweeds are very important as wildlife food.

Submersed Pondweeds

Potamogeton sp.

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Variable-leaf pondweed, *Potamogeton diversifolius*

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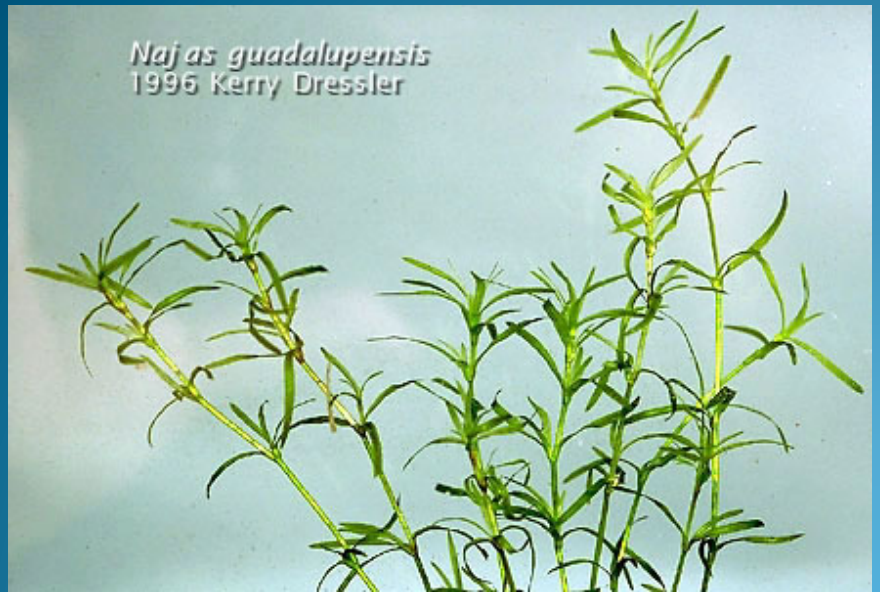
Submersed Pondweeds

Potamogeton illinoensis

Submersed Southern Naiad
Najas guadalapensis



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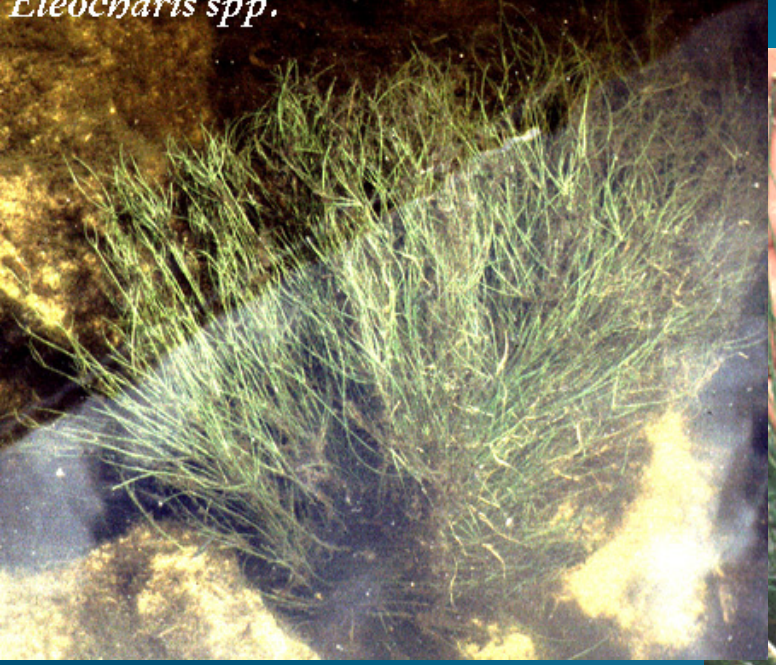

Submersed to Emergent

Spikerush

Eleocharis baldwinii

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Road-grass

Proliferating spikerush
Eleocharis baldwinii

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Floating Leaf

Plants rooted in bottom,
Most leaves float on the surface,
or may be slightly raised above the surface
in mature plants.

Watershield
Brasenia schreberi

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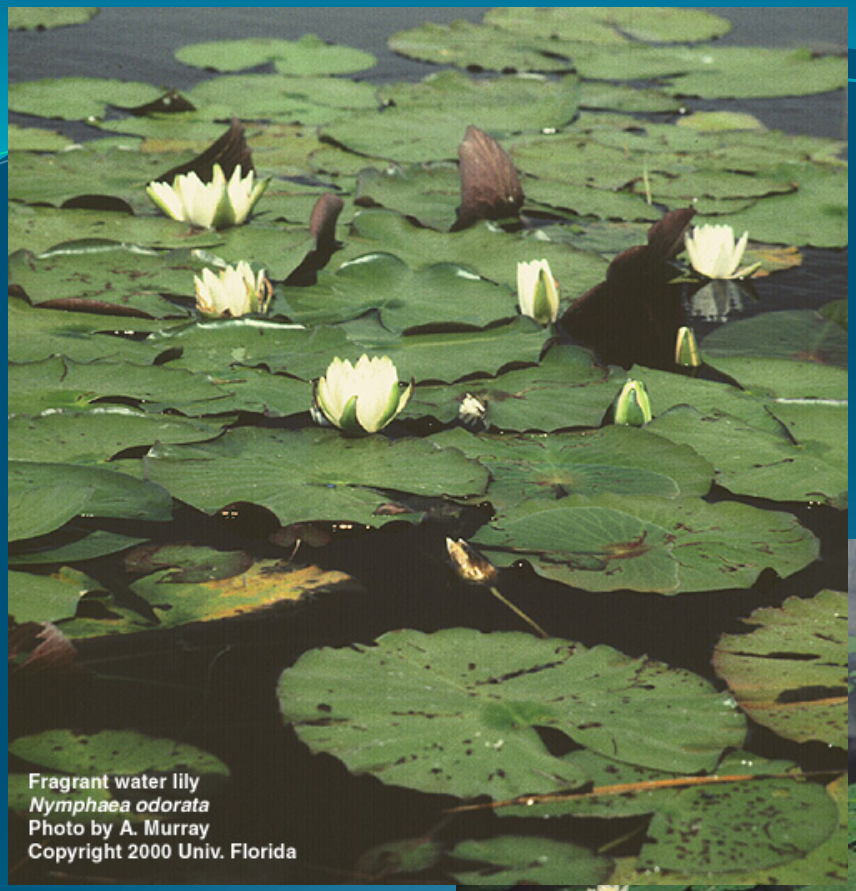
Fragrant water lily
Nymphaea odorata



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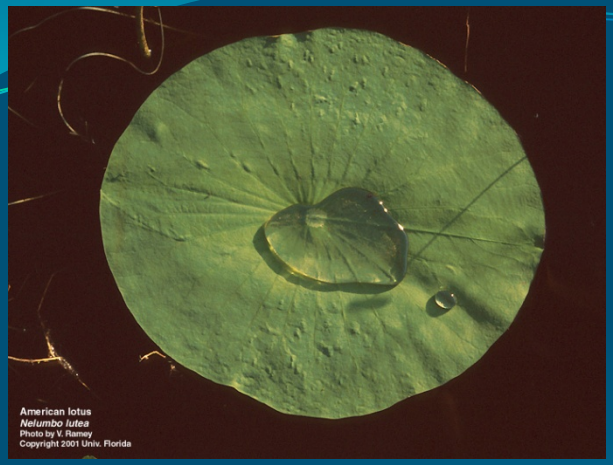
American lotus
Nelumbo lutea



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Spatterdock, cow lily
Nuphar lutea

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Big floatingheart
Banana lily
Nymphoides aquatica

Don't confuse with *Nymphaea mexicana* (yellow water lily)

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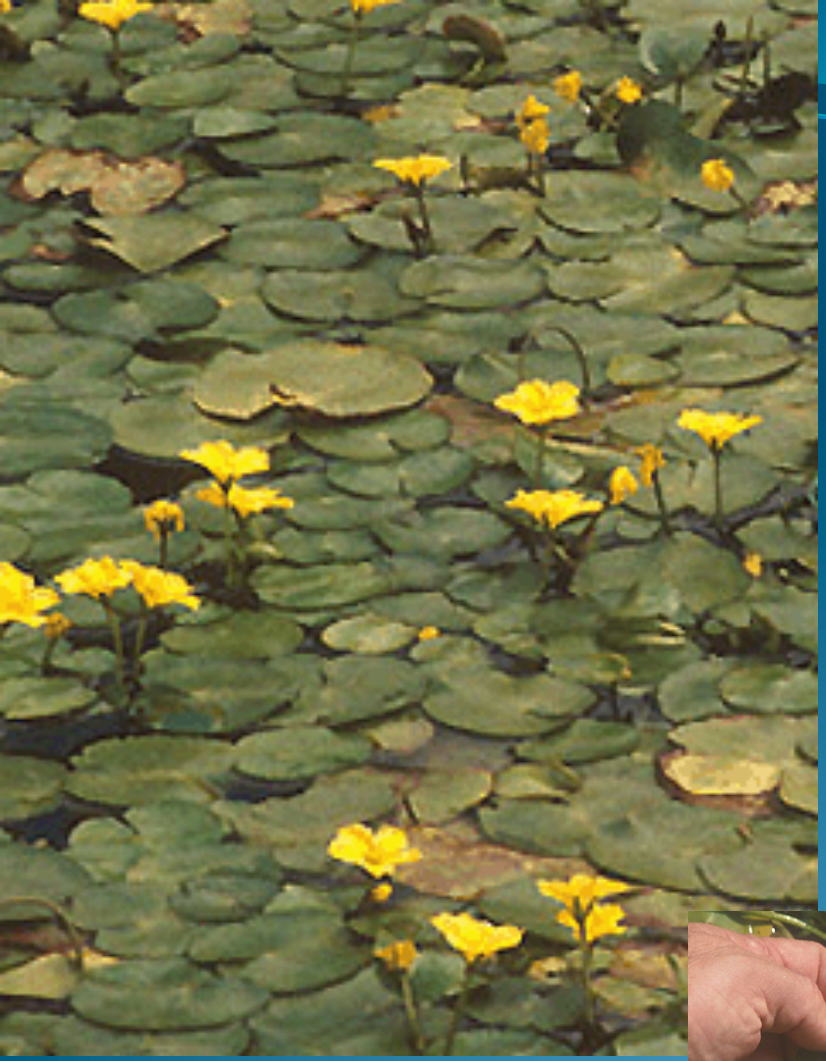
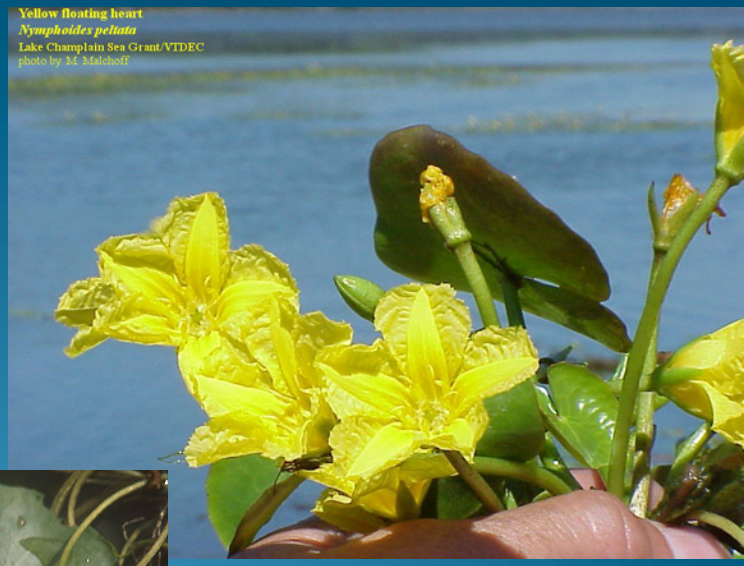
Yellow floating heart
Nymphoides peltata





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Web sites for more information

SCDNR – Aquatic Nuisance Species Program
http://www.dnr.sc.gov/invasiveweeds/

SCDNR – Freshwater Fisheries
http://www.dnr.sc.gov/water/aquaff/

UF/IFAS Center for Aquatic and Invasive Plants
http://plants.ifas.ufl.edu/